DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 04/30/2008 have been fully considered but they are not persuasive. Examiner does not agree with applicant's assumption that Meir power to the thermoelectric element and to the fan is increased at the same time. In paragraph [0052] Meir discloses that: "optionally, the method further comprises the steps of sampling data from the processor temperature sensor; determining whether the sampled data is within a pre-selected acceptable range, and if said data is higher than the pre-selected range, setting a PWM signal output from the microprocessor to maximum (about 100% PWM) to operate the thermoelectric element(s) at maximum power; and operating the processor cooling fan at maximum speed for maximum cooling of the processor.". There is no indication that the power to the thermoelectric element and to the fan maximized at the same time. Moreover, in paragraph [0056] Meir discloses that: "Optionally, the method further comprises periodically checking for sharp increases in temperature (dT/dt); and, if the current temperature is at least some predetermined value, say about 2 ° degree. C. (or other value), higher than the temperature previously sampled, setting the PWM signal output from said microprocessor to maximum (100% PWM) to operate said thermoelectric element at maximum power; and operating the processor fan at maximum speed for maximum cooling with fast reaction time to prevent sharp increase in processor temperature." Hence, Meir clearly indicates the presence of some (although small) time interval between maximizing power to the thermoelectric element and maximizing speed of the

fan. It is also clear, that, either the proposed invention or the device by Meir, each provides a fan with additional capacity for cooling a CPU in response to further increasing of its temperature, when TEC has reaches its limit in consuming a driving power. From examiner's point of view, from such a moment the structure would resemble a typical CPU cooling with a fan having variable speed in response to CPU's temperature, which is well known in the art. That is why it would be obvious to one having ordinary skill in the art to manipulate fan's speed in the device by Meir, after the TEC reaches its limit.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 21 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over previously cited Meir (US Patent Application Publication 2005/0174737 A1).

:Meir teaches a computer system, Fig. 5, comprising: a microelectronic die 319 having an integrated circuit formed therein; a thermoelectric module 318 thermally coupled to the microelectronic die 319 so as to pump heat from the microelectronic die when current is provided to the thermoelectric module 318; a cold side plate 317; a hot side plate (heat sink) 315; a cold-side temperature sensor 320 at one side of the thermoelectric module; and a controller 322 connected to the temperature sensor 320 to receive an indication of temperature at the temperature sensor 320 as an input into the controller 322, the controller 322 controlling the current provided to the thermoelectric module based on the input. Meir teaches furthermore the computer system of claim 1, further comprising: an ambient temperature sensor 324 detecting ambient temperature of air distant from the microelectronic die 319 and the thermoelectric module 318, the controller being connected to the ambient temperature sensor 324 to receive an indication of temperature at the ambient temperature sensor 324, the controller 322 controlling current provided to the thermoelectric module 318 based on an input from the ambient temperature sensor 324. Meir teaches furthermore the computer system further comprising: a fan 314 inherently provided with a motor coupled to the fan to rotate the fan so that the fan cools the microelectronic die 319 when power is provided to the motor, the controller controlling power provided to the thermoelectric module and to the motor such that power to the thermoelectric module is limited (It inherently has its limited maximum); and fan speed is accelerated (To its inherent maximum). Meir does not teach that Controller software algorithm is programmed to accelerate fan speed when power to the thermoelectric module reaches a predetermined maximum value, wherein .power to the thermoelectric module and motor increases/decreases with an increase/decrease, respectively, in cooling requirements of the microelectronic die up to a predetermined value for the thermoelectric module, and wherein above the predetermined value, the power to the thermoelectronic module is limited while the power to the motor continues to increase/decrease with an increase/decrease, respectively, in cooling requirements of the microelectronic die.

However, Meir teaches (See paragraphs [0117] – [0123]; [0050]-[0052] and Figs. 8, 9) that when CPU is in allowed temperature range, TEC power and fan speed are at about 66%, and when CPU temperature is above allowed range, TEC power and fan speed both go to 100%. Meir does not teach that happening at the same time, but to the contrary, teaches that there is a small time interval between the TEC reaching its limit and the fan speed being maximized (see [0052] cited above with examiner comments). Therefore, it would have been obvious to one having ordinary skill in the art at the time invention was made to program the controller software algorithm in the device by Meir to accelerate fan speed when power to the thermoelectric module reaches a predetermined maximum value, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233,235 (CCPA 1955); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382; In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). For more recent case applying this principle, see Merk & Co. inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

4. Claims 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meir and further in view of Atkinson (US Patent Application Publication 2005/0204747 A1).

Meir teaches all the limitations of the claims except the computer system of claim 1, further comprising: a vapor chamber between the microelectronic die and the thermoelectric module; and a fluid in the vapor chamber, the fluid being evaporated when heat transfers thereto from the microelectronic die and condensing when heat transfers therefrom to the thermoelectric module. Atkinson teaches a thermoelectrically cooling electronic device 10, Fig. 6, comprising an a heat generating electronic component 44; a thermoelectric module 14; a hot side heat sink 12 mounted on a top of the heat sink 12; and a vapor chamber 16 between the electronic component 44 and the thermoelectric module 14; and a fluid in the vapor chamber, the fluid being evaporated when heat transfers thereto from the microelectronic die and condensing when heat transfers therefrom to the thermoelectric module (see paragraph [0013]). It would have been obvious to one having ordinary skill in the art at the time invention was made to employ a vapor chamber between the microelectronic die and the thermoelectric module, as it is disclosed by Atkinson, in the device by Meir, in order to enhance heat dissipation from the heat generating microelectronic die.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meir as applied to claim 21 above, and further in view of Watanabe (US Patent 6,817,191).

Meir teaches all the limitations of the claims except the computer system of claim 2, further comprising: a hot plate thermally coupled to the thermoelectric module, with the thermoelectric module between the microelectronic die and the hot plate; and a hot-side temperature sensor on a side of the thermoelectric module of the hot plate and opposing the microelectronic chip, the controller being connected to the hot-side temperature sensor to receive an indication of temperature at the hot-side temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the hot-side temperature sensor. Watanabe teaches a thermoelectrically cooling electronic device, Figs. 1-2, comprising: a hot plate (heat sink) 3 thermally coupled to the thermoelectric module 2, with the thermoelectric module between a cooled component 1 and the hot plate 3; and a hot-side temperature sensor 4 on a side of the thermoelectric module of the hot plate 3 and opposing the cooled component 1, the controller being connected to the hot-side temperature sensor to receive an indication of temperature at the hot-side temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the hot-side temperature sensor 4. It would have been obvious to one having ordinary skill in the art at the time invention was made to employ a hot-side temperature sensor on a side of the thermoelectric module of the hot plate and opposing the microelectronic chip, the controller being connected to the hot-side temperature sensor to receive an indication of temperature at the hot-side temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the hot-side temperature sensor, as Watanabe discloses it in the device by Meir, in order to diversify control of the thermoelectric module.

6. Claims 5, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meir as applied to claim 21 above, and further in view of Richman (US Patent 4,685,081). Meir teaches all limitations of the claims except the computer system of claim 2, further comprising: a junction temperature sensor within the microelectronic die, the controller

being connected to the junction temperature sensor to receive an indication of temperature at the junction temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the junction temperature sensor. Richman teaches a Peltier junction used for thermal control of solid-state devices comprising a junction temperature sensor 43 within the microelectronic die 21 (col. 3, lines 49-64), the controller 39 being connected to the junction temperature sensor to receive an indication of temperature at the junction temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the junction temperature sensor 43. It would have been obvious to one having ordinary skill in the art at the time invention was made to employ a junction temperature sensor within the microelectronic die, the controller being connected to the junction temperature sensor to receive an indication of temperature at the junction temperature sensor, the controller controlling current provided to the thermoelectric module based on an input from the junction temperature sensor in the device by Meir, as Richman discloses it, in order to diversify control of the thermoelectric module.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meir in view Richman as applied to claim 6 above, and further in view of Palfy et al (US Patent 6,470,696).

Meir in view of Richman teach all limitations of the claim except the computer system of claim 6, further comprising: an ambient moisture sensor detecting ambient moisture of air distant from the microelectronic die and the thermoelectric module, the controller being connected to h the ambient moisture sensor to receive an indication of moisture at the ambient moisture sensor, the controller controlling current provided to the thermoelectric module based on an input from the ambient moisture sensor. Palfy et al teach a thermoelectric cooler for computer/electronic devices comprising an ambient moisture sensor 13 detecting ambient moisture of air distant from the thermoelectric module, the controller 20 being connected to h the ambient moisture sensor 13 to receive an indication of moisture at the ambient moisture sensor, the controller 20 controlling current provided to the thermoelectric module based on an input from the ambient moisture sensor (see Fig. 4). It would have been obvious to one having ordinary skill in the art at the time invention was made to employ an ambient moisture sensor detecting ambient moisture of air distant from the microelectronic die and the thermoelectric module, the controller being connected to h the ambient moisture sensor to receive an indication of moisture at the ambient moisture sensor, the controller controlling current provided to the thermoelectric module based on an input from the ambient moisture sensor in the device by Meir and Richman, as Palfy et al disclose it, in order to diversify control of the thermoelectric module.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. The prior art made of record provided in the PTO Form 892 and not relied upon is considered pertinent to applicant's disclosure, representing numerous examples of electronic cooling systems comprising a fan and a TEC , or just a fan, having TEC's power and/or fan's power or speed being manipulated in response to increasing/decreasing temperature of a heat generating electronic component.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V. Datskovskiy whose telephone number is (571)272-2040. The examiner can normally be reached on 8:30am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash N. Ganghi can be reached on (571)272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

06/05/2008
/Michael V Datskovskiy/
Primary Examiner, Art Unit 2835

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